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EXAMINER

SCHWARTZ, DARREN B

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PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/521,789	Applicant(s) SATO ET AL.	
	Examiner DARREN SCHWARTZ	Art Unit 2435	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 12 November 2008.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-10, 12-18, 20 and 21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-10, 12-18, 20 and 21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Arguments

1. In light of the amendments to the drawings, the objection is withdrawn.
2. In light of the amendments to the claims, the previous grounds of rejection under 35 U.S.C. 112, second paragraph are withdrawn. However, new grounds of rejection under 35 U.S.C. 112, second paragraph are presented below.
3. In light of the amendments to the claims, the 35 U.S.C. 112, first paragraph is withdrawn.

Applicant's arguments with respect to claims 1-10, 12-18, 20 and 21 have been considered but are moot in view of the new ground(s) of rejection.

Applicant and applicant's representative are to carefully consider the newly added art as applied or applicable to the claimed invention.

The fact that the Examiner may not have specifically responded to any particular arguments made by Applicant and Applicant's Representative, should not be construed as indicating Examiner's agreement therewith.

Claim Objections

Claim 1 is objected to because of the following informalities: Claim 1 recites “a watermark generation section that generates in a program watermark that differs...” and should probably recite “a watermark generation section that generates a program watermark that differs...” or perhaps “a watermark generation section that generates in a program a watermark that differs...”

Appropriate correction is required.

Claim Rejections - 35 USC § 112

The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 1-10, 12-18, 20 and 21 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Claim 1 recites the limitations “a first assignment expression embedding section that defines a plurality of functions that output a plurality of predetermined constants, respectively, from said watermark and embeds in said program a plurality of expressions that assign said plurality of functions to a plurality of variables, respectively.” It is unclear as to what applicant means by “respectively.” The term “respectively” is used to particularly define an order given; however, the claimed limitations do not have an order. This issue is further raised in claims 7, 9, 17 and 18.

Any claim not specifically addressed above is being rejected as incorporating the deficiencies of a claim upon which it depends.

Claim Rejections - 35 USC § 102

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

5. Claims 1-4, 6-10, 17 and 18 rejected under 35 U.S.C. 102(e) as being anticipated by Chang et al (U.S. Pat 7287166 B1), hereinafter referred to as Chang. The Examiner has provided the provisional application 60/396186 filed 16 July 2002.

Re claim 1: Chang teaches a watermark insertion apparatus comprising:

a watermark generation section that generates in a program watermark that differs for each of a plurality of distribution destinations of said program (col 55, lines 18-28; col 56, lines 18-28);

a first assignment expression embedding section that defines a plurality of functions that output a plurality of predetermined constants (col 57, lines 16-55; col 58, line 48 – col 59, line 8; col 60, lines 42-57), respectively, from said watermark and embeds in said program a plurality of expressions that assign said plurality of functions to a plurality of variables (col 57, lines 16-55; col 58, line 48 – col 59, line 8; col 60, lines 42-57), respectively;

a code insertion section that sets as a watermark verification code a decision statement of a conditional branch for deciding whether each of said plurality of variables

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and each of said plurality of constants are equal (col 42, lines 52-63: particularly code line 7), and halting said program if each of said plurality of variables and each of said plurality of constants are not equal (col 18, lines 24-61), and that inserts in said program said watermark verification code which, if said watermark or said watermark verification code is tampered, does not operate said program properly and which comprises same content regardless of said plurality of distribution destinations (col 20, lines 24-50; col 56, lines 29-50; col 57, lines 39 – 56; col 58, lines 5-7);

a second assignment expression embedding section that generates another function that outputs another constant such that a sum of said another constant and a sum of said plurality of constants is zero and embeds in said program an expression that assigns said another function to another variable (col 42, line 41 – col 43, line 45); and

an addition section that generates and inserts as a verification code a code that adds a total value of said another variable and said sum of said plurality of variables to said decision statement of said conditional branching in said program such that said decision statement of said program of a decision branch is not affected if said watermark and watermark verification code are not tampered (col 55, lines 18-28; col 56, lines 51-67; col 57, lines 26-56).

Re claim 2: Chang teaches said watermark is generated from ID information that uniquely determines a program distribution destination (col 1, lines 35-38 and lines 45-49).

Re claim 3: Chang teaches a function insertion section that defines a function that outputs a predetermined constant from said watermark and inserts an expression that assigns said function to a variable in said program (col 5, lines 26-47); wherein said watermark verification code is a conditional branch that determines whether said variable and said constant are equal, and when said variable and said constant are not equal halts said program (col 17, lines 25-35; col 18, lines 36-43; col 42, lines 52-63); and said watermark verification code is made identical regardless of said distribution destination (col 5, lines 1-25; col 8, lines 5-21; col 9, line 57 – col 10, line 22).

Re claim 4: Chang teaches watermark verification code is necessary for said program to be made to operate correctly (Abstract).

Re claim 6: Chang teaches a program input section that inputs a program in which the watermark insertion apparatus according to claim 1 has inserted said watermark and said watermark verification code (see claim 1 above); and a watermark detection section that extracts said watermark from said program and generates ID information that uniquely identifies said distribution destination based on said watermark; wherein a distribution destination is identified based on generated said ID information (col 55, lines 29-40).

Re claim 7: Chang teaches a program illegal distribution prevention system comprising: a watermark insertion apparatus; and

a watermark extraction apparatus (col 3, lines 57-66), wherein said watermark insertion apparatus comprises:

a watermark generation section that generates watermark that differs for each of a plurality of distribution destinations of a program (col 55, lines 18-28; col 56, lines 18-28);

a first assignment expression embedding section that defines a plurality of functions that output a plurality of predetermined constants (col 57, lines 16-55; col 58, line 48 – col 59, line 8; col 60, lines 42-57), respectively, from said watermark and embeds in said program a plurality of expressions that assign said plurality of functions to a plurality of variables (col 57, lines 16-55; col 58, line 48 – col 59, line 8; col 60, lines 42-57), respectively;

a code insertion section that sets as a watermark verification code a decision statement of a conditional branch for deciding whether each of said plurality of variables and each of said plurality of constants are equal (col 42, lines 52-63: particularly code line 7), and halting said program if each of said plurality of variables and each of said plurality of constants are not equal (col 18, lines 24-61), and that inserts in said program said watermark verification code which, if said watermark or said watermark verification code is tampered, does not operate said program properly and which comprises same content regardless of said plurality of distribution destinations (col 20, lines 24-50; col 56, lines 29-50; col 57, lines 39 – 56; col 58, lines 5-7);

a second assignment expression embedding section that generates another function that outputs another constant such that a sum of said another constant and a sum of said plurality of constants is zero and embeds in said program an expression

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that assigns said another function to another variable (col 42, line 41 – col 43, line 45);
and

an addition section that generates and inserts as a verification code a code that adds a total value of the another variable and said sum of said plurality of variables to said decision statement of said conditional branching in said program such that said decision statement of said program of a decision branch is not affected if said watermark and watermark verification code are not tampered (col 55, lines 18-28; col 56, lines 51-67; col 57, lines 26-56); and said watermark extraction apparatus comprises:

a program input section that inputs a program in which the watermark insertion apparatus has inserted said watermark and said watermark verification code (col 55, lines 18-28; col 56, lines 29-67); and

a watermark detection section that extracts said watermark from said program and generates ID information that uniquely identifies said distribution destination based on said watermark; a distribution destination is identified based on said generated said ID information in said watermark extraction apparatus (col 55, lines 29-40).

Re claim 8: Chang teaches said watermark insertion apparatus is provided at said distribution destination (col 8, lines 5-44).

Re claim 9: Claim 9 is rejected under similar grounds as those provided for claim 7.

Re claim 10: Chang teaches inserting in said program said watermark that differs for each program distribution destination (col 55, lines 18-28; col 56, lines 18-28); and

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converting a periphery of an insertion location of said watermark or said entire program while maintaining specifications of said program (col 40, line 66 – col 41, line 14).

Re claim 17: Chang teaches a watermark extraction apparatus comprising:

a program input section that inputs a program in which the watermark insertion apparatus comprises:

a watermark insertion section that inserts in a program watermark that differs for each of a plurality of distribution destinations of said program (col 55, lines 18-28; col 56, lines 18-28);

a first assignment expression embedding section that defines a plurality of functions that output a plurality of predetermined constants (col 57, lines 16-55; col 58, line 48 – col 59, line 8; col 60, lines 42-57), respectively, from said watermark and embeds in said program a plurality of expressions that assign said plurality of functions to a plurality of variables (col 57, lines 16-55; col 58, line 48 – col 59, line 8; col 60, lines 42-57), respectively;

a code insertion section that sets as a watermark verification code a decision statement of a conditional branch for deciding whether each of said plurality of variables and each of said plurality of constants are equal (col 42, lines 52-63: particularly code line 7), and halting said program if each of a plurality of variables are not equal (col 18, lines 24-61), and that inserts in said program said watermark verification code which, if said watermark or said watermark verification code is tampered, does not operate said program properly and which comprises same content regardless of said plurality of

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distribution destinations (col 20, lines 24-50; col 56, lines 29-50; col 57, lines 39 – 56; col 58, lines 5-7);

a second assignment expression embedding section that generates another function that outputs another constant such that a sum of said another constant and a sum of said plurality of constants is zero .and embeds in said program an expression that assigns said another function to another variable (col 42, line 41 – col 43, line 45);

an addition section that generates and inserts and inserts as a verification code a code that adds a total value of said another variable and said sum of said plurality of variables to said decision statement of said conditional branching in said program such that said decision statement of said program of a decision branch is not affected if said watermark and watermark verification code are not tampered (col 55, lines 18-28; col 56, lines 51-67; col 57, lines 26-56).

a watermark insertion section that inserts in said program said watermark that differs for each program distribution destination (col 55, lines 18-28; col 56, lines 18-28); and

a conversion section that converts a part other than a location at which said watermark is inserted while maintaining specifications of said program (col 40, line 66 – col 41, line 14); and

a watermark detection section that extracts said watermark from said program; wherein a distribution destination is identified based on extracted said watermark (col 55, lines 29-40).

Re claim 18: Chang teaches a watermark extraction apparatus comprising:

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a program input section that inputs a program in which the watermark insertion apparatus comprises:

a watermark insertion section that inserts in a program watermark that differs for each of a plurality of distribution destinations of said program (col 55, lines 18-28; col 56, lines 18-28);

a first assignment expression embedding section that defines a plurality of functions that output a plurality of predetermined constants (col 57, lines 16-55; col 58, line 48 – col 59, line 8; col 60, lines 42-57), respectively, from said watermark and embeds in said program a plurality of expressions that assign said plurality of functions to a plurality of variables (col 57, lines 16-55; col 58, line 48 – col 59, line 8; col 60, lines 42-57), respectively;

a code insertion section that sets as a watermark verification code a decision statement of a conditional branch for deciding whether each of said plurality of variables and each of said plurality of constants are equal, and halting said program if each of a plurality of variables are not equal, and that inserts in said program said watermark verification code which, if said watermark or said watermark verification code is tampered, does not operate said plurality properly and which comprises same content regardless of said plurality of distribution destinations;

a second assignment expression embedding section that generates another function that outputs another constant such that a sum of said another constant and a sum of said plurality of constants is zero and embeds in said program an expression that assigns said another function to another variable (col 42, line 41 - col 43, line 19);

an addition section that generates and inserts and inserts as a verification code a code that adds a total value of said another variable and said sum of said plurality of variables to said decision statement of said conditional branching in said program such that said decision statement of said program of a decision branch is not affected if said watermark and watermark verification code are not tampered (col 55, lines 18-28; col 56, lines 51-67; col 57, lines 26-56)

a watermark insertion section that inserts in said program said watermark that differs for each program distribution destination (col 55, lines 18-28; col 56, lines 18-28); and

a conversion section that converts a part other than a location at which said watermark is inserted while maintaining specifications of said program (col 40, line 66 – col 41, line 14); and

a watermark detection section that obtains said identification information, identifies a watermark insertion location from said identification information (col 55, lines 29-40), and

extracts said watermark from only identified said watermark insertion location; wherein a distribution destination is identified based on extracted said watermark (col 55, lines 55-57), and

wherein said identification information is a method name or line number (Chang: col 25, lines 17-33).

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

6. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (U.S. Pat 7287166 B1), hereinafter referred to as Chang, in view of Cousot et al (U.S. Pat Pub 2006/0010430 A1), hereinafter referred to as Cousot.

Re claim 5: Chang teaches all the limitations of claim 4. However, Horning teaches said watermark verification code has inserted a calculation expression that does not affect a decision statement of a decision branch generated from said watermark in said decision branch extracted from said program (page 18, “`public class Fibonacci`” and page 19, “`public class fibonacciWatermark;`” the watermarked Fibonacci class has no decision statements that are affected by the watermarking).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Chang with the teachings of Cousot, for the purpose of watermarking an executable without altering the semantics of the executable; this is the main goal of Cousot and both references are analogous in that they both teach the watermarking of executable code.

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7. Claims 12-16 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (U.S. Pat 7287166 B1), hereinafter referred to as Chang, in view of Horning et al (U.S. Pat Pub 2007/0234070 A1), hereinafter referred to as Horning.

Re claim 12: Chang teaches all the limitations of claim 1.

However, Horning teaches a watermark insertion section that inserts in a program watermark that differs for each program distribution destination (§606); and a conversion section that converts a part other than a location at which said watermark is inserted while maintaining specifications of said program (§610-§611).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Chang with the teachings of Horning, for the purpose of providing executables that are watermarked and obfuscated. It is known in the art of generating tamper-resistant executables to use watermarks and code obfuscation for the purpose of armoring executables.

Re claim 13: The combination of Chang and Horning teaches said conversion section inserts an execution code pair that does not affect specifications in a part other than a location at which said watermark is inserted (Horning: §18, §151, §610-§611).

Re claim 14: The combination of Chang and Horning teaches identification information is stored that indicates an insertion location of said watermark (Horning: Fig 37A, §615-§617).

Re claim 15: The combination of Chang and Horning teaches said identification information is a method name or line number (Chang: col 25, lines 17-33).

Re claim 16: The combination of Chang and Horning teaches said conversion section performs obfuscating so that specifications are not affected in a part other than a location at which said watermark is inserted (Horning: ¶¶606, ¶¶610-¶¶611).

Re claim 20: The combination of Chang and Horning teaches said conversion section converts a sequence of a part that is a part other than a location at which said watermark is inserted and is a part that does not affect specifications even if said sequence is switched around (Horning: ¶¶606, ¶¶610-¶¶611).

8. Claim 21 is rejected under 35 U.S.C. 103(a) as being unpatentable over Chang et al (U.S. Pat 7287166 B1), hereinafter referred to as Chang, in view of, Horning et al (U.S. Pat Pub 2007/0234070 A1), hereinafter referred to as Horning, in view of Davidson et al (U.S. Pat 5559884 A), hereinafter referred to as Davidson.

Re claim 21: The combination of Chang and Horning teaches all the limitations of claim 20 as previously discussed.

However Davidson teaches historical information [execution flow] on a part that does not affect said specifications is held, and using said historical information [execution flow], conversion of a part that does not affect said specifications is made to differ for each distribution destination (whole Abstract; col 2, lines 61-67).

It would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified the teachings of Chang and Horning with the teachings of Davidson, for the purpose of simultaneously obfuscating/scrambling executable program code and uniquely watermarking said executable program code

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based on said obfuscation while maintaining program semantics. All references are analogous art as all references teach the protection and watermarking of executable program code.

Conclusion

Examiner's Note: Examiner has cited particular columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the text of the passage taught by the prior art or disclosed by the examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

U.S. Pat 5287408 A

U.S. Pat 5745569 A

U.S. Pat 5892899 A

U.S. Pat 6330549 B1

U.S. Pat 6697948 B1

U.S. Pat Pub 2001/0044902 A1

U.S. Pat Pub 2002/0099952 A1

U.S. Pat Pub 2003/0037245 A1

U.S. Pat Pub 2003/0221116 A1

U.S. Pat Pub 2003/0023856 A1

U.S. Pat Pub 2005/0021966 A1

U.S. Pat Pub 2005/0055312 A1

U.S. Pat Pub 2005/0081042 A1

U.S. Pat Pub 2008/0028474 A1

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of

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the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DARREN SCHWARTZ whose telephone number is (571)270-3850. The examiner can normally be reached on 8am-4pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Kim Vu can be reached on (571)272-3859. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/D. S./

Examiner, Art Unit 2435

/Kimyen Vu/

Supervisory Patent Examiner, Art Unit 2435